Aviation Services

Fire Weather

Public Forecast

Decision Support

Overview

The NASA SPoRT Program focuses on transitioning unique observations and research capabilities to the operational community with the goal of improving short-term forecasts. In 2007, WFO Albuquerque was selected to participate in this program.

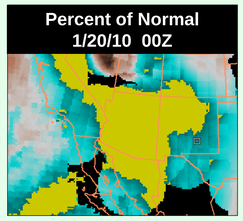
Success of our program is a result of:

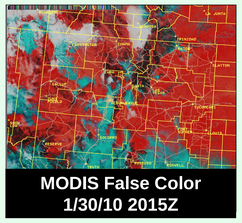
- A coherent team made up of SPoRT staff, the WFO AWIPS focal point, and a local WFO SPoRT focal point,
- "Buy In" from the local staff who are excited to evaluate new products designed to support local forecast challenges, and
- Excellent support from the SPoRT program who make the products available, develop and distribute training modules, and host a blog site for evaluation and feedback

Here we share a history of our collaboration and some examples of positive impacts to our operational programs such as public, aviation and fire weather, as well as enhanced decision support services.

CIRA Precipitable Water

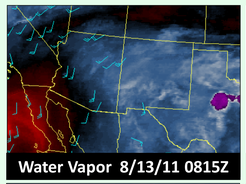
COOL SEASON

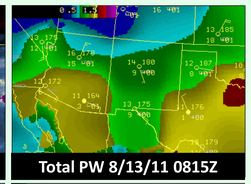




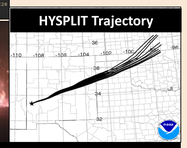
Precipitable water and percent of normal products helped to anticipate higher than normal available moisture for winter storms (above) as well as monsoon season thunderstorms that commonly cause flash flooding.

WARM SEASON

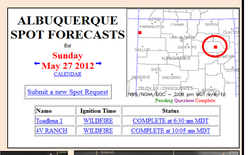


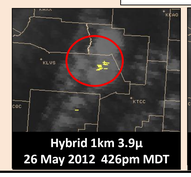


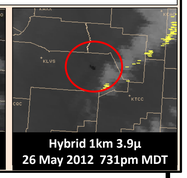
Fire Hot Spot Detection



The hybrid 3.9µ "hotspot" imagery results in a higher resolution view of active wildfires (left) supporting accurate input for smoke plume trajectories. Additionally, earlier detection of fire starts can result using hybrid imagery (right).

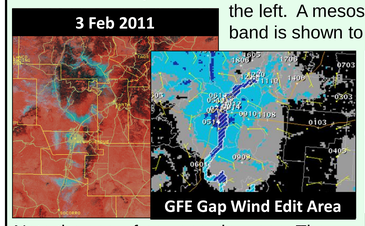




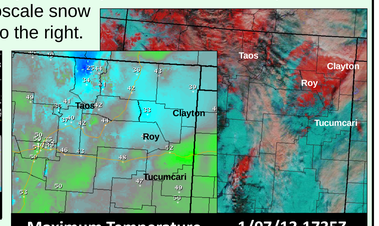


MODIS Snow Cloud RGB

The snow RGB product depicts snow in red and bare ground in green. Downslope winds below canyons in the Rio Grande Valley can easily be seen in the example on the left. A mesoscale snow band is shown to the right.

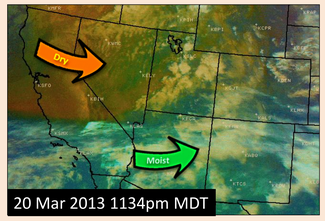


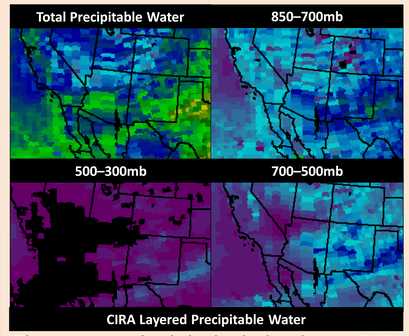
Note the snow free zones in green. The GFE gap wind edit area will be altered to account for this new information.

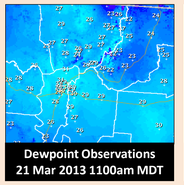


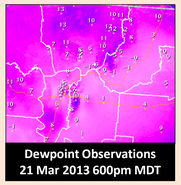
Note the impact of snowfall on the high temperatures the following day.

Airmass RGB and Dry Slot Analysis



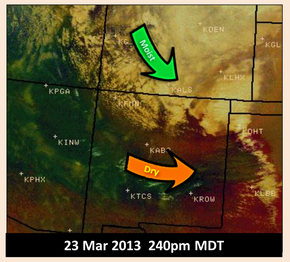


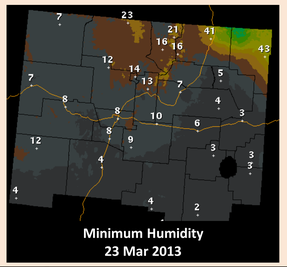




The presence of red shades in the airmass RGB indicates the presence of very dry air. The example in the top left shows a dry intrusion approaching from the west on March 21, 2013 that resulted in critical fire weather conditions.

A dynamic dry slot event on March 23, 2013 shown on the lower right produced widespread strong winds and critical to extreme fire weather conditions. We will continue to analyze this imagery to improve detection of critical fire weather.





2007-2008 — After selection in 2007, it took just over a year to start the product flow into our office.

2009 — The CIRA precipitable water products proved to be exceptionally valuable, and were updated in late 2009.

2010 — The first RGB products were introduced in the fall of 2010. They proved very useful for snow analyses and temperature predictions.

2011 — High resolution fire hot spot imagery allowed forecasters to analyze growth of wildfires and pinpoint new starts.

2012 — The RGB airmass product is being used to improve detection of critical fire weather patterns.

2013 — 2014 and beyond:
- Front Range Collaboration
- Possible LMA
- Additional inputs to local model

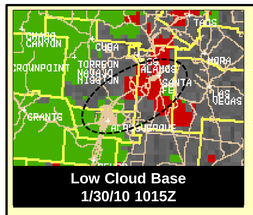
The first products evaluated included MODIS regional imagery and new GOES aviation products. In January of 2009, we participated in a SPoRT intensive study period for fog/low cloud products.

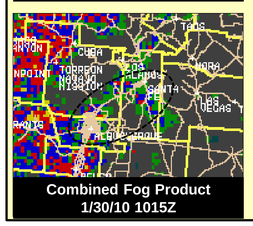
In 2011, MODIS data became easier to view when SPoRT "stitched" images into GOES visible, IR, 3.9µ and 11-3.9µ loops.

SPoRT imagery was key to improving our decision support products during extreme wildfires in 2011 and 2012. Hand drawn graphicasts of smoke plumes were replaced by high resolution MODIS imagery.

RGB products enhance atmospheric characteristics by applying sophisticated color curves to satellite imagery. The recent addition of VIIRS imagery has increased the temporal resolution.

Low Cloud Base and Fog Depth





Fog and low clouds are more common across NM than one might expect in the desert southwest. These products when used together increase forecaster confidence on areas of fog and low clouds that will significantly impact aviation from those that have much less impact. In this example, timely and accurate TAF amendments extended the VLIFR conditions at KSAF where the imagery showed low clouds bases occurring with the presence of fog in the fog product.

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TAF
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TAF AMD
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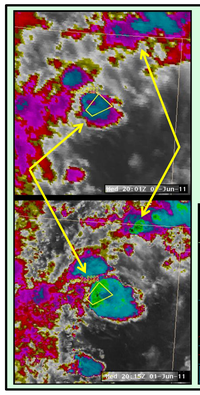
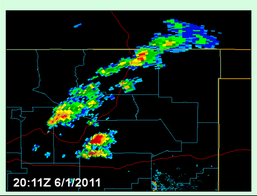
MODIS-GOES Hybrid Products

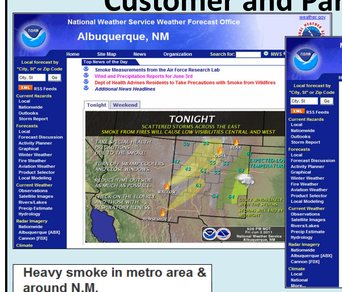




Hybrid products are a composite of traditional GOES imagery with MODIS swaths stitched in when available. Here, the increased resolution that results when stitching the higher resolution MODIS imagery into a GOES loop shows two areas of strong convection, but only one severe thunderstorm warning.

Areas with poor radar coverage in New Mexico benefit from the higher resolution imagery as they provide another layer of data to increase confidence in the decision making process.

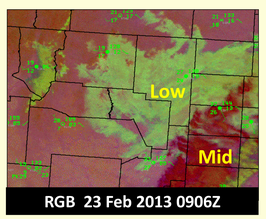
Web Graphics, Social Media, Customer and Partner Support

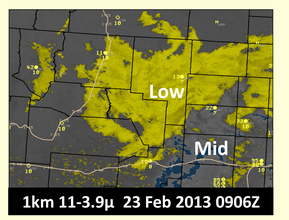


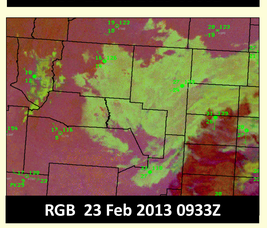
During the historic fire season of 2011, smoke produced large areas of unhealthy air quality. Our decision support services ramped up at a steep rate. MODIS imagery was used to more accurately depict extent of the smoke plumes. We continue to use SPoRT imagery for DSS and regularly share using social media.

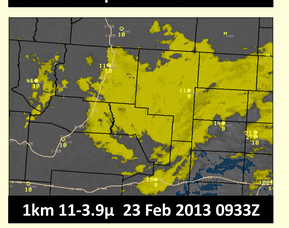
MODIS/VIIRS Nighttime Microphysics RGB

Enhancing the detection of low clouds and fog is a major goal for improving aviation services. The nighttime microphysics RGB shown on the left is a significant improvement over the legacy 11-3.9µ imagery on the right as it differentiates more accurately the presence of low, mid, and high cloud layers.







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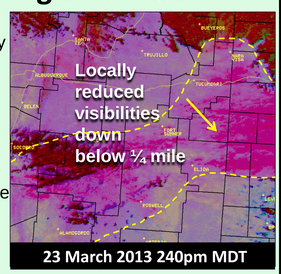
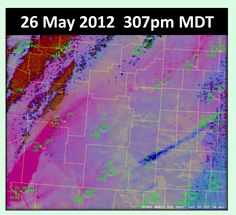
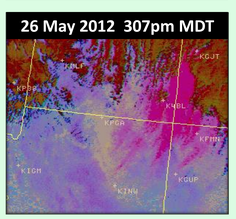
Note the 1056Z TAF amendment includes IFR ceilings for the patch of low clouds moving over the area. This TAF could have been amended even earlier given the 0933Z image available above.

Blowing Dust RGB

This RGB imagery shows blowing dust as magenta. Therefore, the complete impact area, including severe visibility restrictions, can be determined and included in short term forecasts and warnings.







The image on the top left from April 14, 2012 depicts a dust plume emanating from the El Paso area. The image on the bottom left from May 26, 2012 details a more rare case of blowing dust in the Four Corners region.

Albuquerque

Working with NASA SPoRT to Transition New Satellite Products into NWS Operational Forecasting and Decision Support Services

Brian Guyer and Deirdre Kann, NWS Albuquerque

NASA SPoRT Short-term Prediction Research and Transition Center